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EXAMINER

LEUNG, JENNIFER A

ART UNIT PAPER NUMBER

1764

DATE MAILED: 12/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/977,732

Applicant(s)

WARREN, DAVID W.

Examiner

Jennifer A. Leung

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-48 is/are pending in the application.
- 4a) Of the above claim(s) 1-42 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 43-48 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1-48 are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2,3,5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election of Group IV, claims 43-48, in Paper #7 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).
2. Claims 1-42 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

### ***Drawings and Specification***

3. The drawings and specification have not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 43-48 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 43, it is unclear as to the relationship between, "an exit means" in lines 14-15 and "an exit means" set forth in line 10. Also, the term "said tubular reaction chamber" (line 10) lacks proper positive antecedent basis (see also claim 44, line 2 and claim 45, line 10). Also, the term, "the metal fiber surface" (line 21) lacks proper positive antecedent basis.

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Regarding claims 44-48, the recitations of, "The combination of claim..." in the preambles lack proper antecedent basis, since the claims are drawn to an, "Endothermic catalytic reaction apparatus..." as set forth in the preamble of independent claim 43.

Regarding claim 44, it is unclear as to the relationship of, "a centrally located and vertically disposed cylindrical radiant burner" to "a radiant burner" set forth in claim 43, line 17.

Regarding claim 46, the language of the claim is drawn to a method limitation which renders the claim vague and indefinite, as it is unclear as to the structural limitations applicant is attempting to recite by, "the reactant gases... transfer heat to the reaction chamber," since the reactant gases are not considered an element of the apparatus.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 43-48 are rejected under 35 U.S.C. 102(b) as being anticipated by Voecks (US 4,909,808).

Regarding claim 43, Voecks (FIG. 3; generally, column 6, line 38 to column 7, line 18) discloses an apparatus comprising:

a) a straight tubular outer conduit (i.e., inner containment wall **226**) concentrically disposed around an inner conduit (i.e., outer steam reformer wall **224**) to form a reaction chamber containing catalyst in the annular space between the outer conduit wall **226** and the inner conduit wall **224** (i.e., comprising annular space **225**, unlabeled in FIG. 3 but shown as annular space **25**

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in FIG. 1, with a high temperature shift catalyst; column 4, lines 65-68), and an inner conduit defined space (i.e., annular space **223**) for the return flow of reactant gases **62** to an exit means (i.e., conduit **230**); said reaction chamber **225/25** having one end that extends into a combustion chamber (i.e., as illustrated, the upper most end; FIG. 3) and an opposite end that extends outside of the combustion chamber (i.e., as illustrated, the lower most end; FIG. 3), and there being inlet means (i.e., conduit **232**) in communication with the annular space **225/25** and exit means **230** in communication with the inner conduit defined space **223**; and

b) a radiant burner (i.e., fibrous combustor **200**) vertically disposed within said combustion chamber (i.e., defined by outer containment wall **210**) and having a gas permeable zone (i.e., fibrous shell **217**) that inherently promotes the flameless combustion of fuel and oxidant supplied to said burner (i.e., fuel and/or air **50** supplied via distributor **202**).

Regarding claim 44, Voecks discloses a multiplicity of reaction chambers (i.e., a first reaction chamber having a high temperature shift catalyst in space **225/25**, and a second reaction chamber having a steam reforming catalyst in space **223**; FIG. 3), the chambers being concentrically disposed around the centrally located, vertically disposed, cylindrical radiant burner **200**, inherently having a 360° radiant arc by virtue of its domed structure (i.e., fibrous dome portion **20**, FIG. 1).

Regarding claim 45, Voecks (FIG. 3) discloses a convection chamber extending about a portion of reaction chamber **225/25** in the proximity of the end containing the reactant gas inlet and exit means **232**, **230** (i.e., see FIG. 3, wherein the combustion chamber as defined by wall **210** extends to the proximity to the inlet and exit means; also see column 3, lines 25-32); said convection chamber also having an inlet means (i.e., for fuel and/or air **50**, through inlet feed

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distributor **202**) in communication with the combustion chamber and an exit means (i.e., indicated by flow arrows **54**) for combustion products outside the combustion chamber.

Regarding claim 46, no further structural limitations are recited since the reactant gases are not considered an element of the apparatus. In any event, the apparatus of Voecks meets the claims, since the outer and inner conduit walls **226** and **224**, respectively, inherently conduct heat, and would therefore exhibit the recited heat transfer property depending on the intended reaction(s) being conducted by the apparatus (i.e., endothermic, etc.).

Regarding claims 47 and 48, Voecks discloses radiant burner **200** (FIG. 3) comprising a supported metal or ceramic fiber material (i.e., "a fibrous material composed of alumina, silica, or other similar and commonly used oxide material," or "a 'sponge' type of material which can be metallic or oxide material with varying by generally small pore, high porosity material," column 2, lines 55-63).

Instant claims 43-48 structurally read on the apparatus of Voecks.

6. Claims 43-46 are rejected under 35 U.S.C. 102(b) as being anticipated by Shirasaki et al. (US 5,639,434).

Regarding claim 43, Shirasaki et al. (i.e., the embodiment of FIG. 5-7; see FIG. 1 and 2 for identification of corresponding structural elements; column 13, line 62 to column 14, line 41; column 15, line 28 to column 16, line 17) discloses an apparatus comprising:

a) a straight tubular outer conduit (i.e., defined by intermediate cylinder **18** and inner cylinder **20**) concentrically disposed around an inner conduit (i.e., defined by hydrogen permeable tubes **32**) to form a reaction chamber (i.e., inner annulus **30**) containing catalyst (i.e., reforming catalyst A) in the annular space between the outer conduit wall **18/20** and the inner

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conduit wall **32** (see FIG. 2), and an inner conduit defined space (i.e., annulus **33**) for the return flow of reactant gases (i.e., permeated hydrogen) to an exit means (i.e., hydrogen outlet **52**); said reaction chamber **30** having one end that extends into a combustion chamber (i.e., space **26**) and an opposite end that extends outside of the combustion chamber (i.e., as illustrated in FIG. 1, the uppermost end), and there being inlet means (i.e., reaction gas inlet **48**) in communication with the annular space **30** and exit means (i.e., hydrogen outlet **52**) in communication with the inner conduit defined space **33**; and

b) a radiant burner (i.e., comprising combustion burner **44** and cylindrical radiating body **62**; see FIG. 5-7; column 11, lines 16-26) vertically disposed within said combustion chamber **26** and having a gas permeable zone (i.e., "The radiating body should preferably have a porous wall so that combustion gas can flow through the porous wall to efficiently heat the radiating body," column 11; lines 27-29) that inherently promotes the flameless combustion of fuel **45** and oxidant **47** supplied to said burner.

Regarding claim 44, Shirasaki et al. (i.e., the embodiment of FIG. 25-27; see FIG. 23 and 24 for identification of corresponding structural elements; column 25, line 42 to column 27, line 57) discloses the apparatus comprising a multiplicity of reaction chambers (i.e., a first catalyst layer **528** and a second catalyst layer **530**, comprising reforming catalyst **A**; see FIG. 24), concentrically disposed around a centrally located and vertically disposed cylindrical radiant burner (i.e., combustion burner **644** with cylindrical radiating body **662**) having a 360° radiant arc by virtue of the cylindrical surface of radiating body **662** (column 7, lines 51-57).

Regarding claim 45, Shirasaki et al. (i.e., FIG. 5-7; see FIG. 1 and 2 for identification of corresponding structural elements; column 14, lines 1-14 and 59-65) discloses a convection

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chamber (i.e., defined by outer annulus **24**) extending about a portion of the reaction chamber **30** in the proximity of the end containing the reactant gas inlet **48** and exit **52** means; said convection chamber **24** having an inlet means in communication with the combustion chamber **26** (i.e., located proximate to the closed annular base section **22**) and an exit means (i.e., combustion gas outlet **46**) outside the combustion chamber.

Regarding claim 46, no further structural limitations are recited since the reactant gases are not considered an element of the apparatus. In any event, the apparatus of Shirasaki et al. meets the claims, since the outer and inner conduit walls inherently conduct heat, and would therefore exhibit the recited heat transfer property depending on the intended reaction(s) being conducted by the apparatus (i.e., endothermic, etc.).

Instant claims 43-46 structurally read on the apparatus of Shirasaki et al.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 47 and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shirasaki et al. (US 5,639,434) in view of Voecks (US 4,909,808).

Shirasaki et al. discloses radiant burner **44/62** (FIG. 5-7), "should preferably have a porous wall so that the combustion gas can flow through the porous wall to efficiently heat the radiating body," (column 11, lines 27-29), but is silent as to the burner comprising, specifically, a supported metal or supported ceramic fiber material. In any event, it would have been obvious

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for one of ordinary skill in the art at the time the invention was made to select an appropriate material, such as the recited metal and ceramic fiber materials, for the radiant burner of Shirasaki et al. because the use of such materials for radiating heat in burner-type applications is well known in the art, as evidenced by Voecks et al., who teaches a combustor comprising, "a fibrous material composed of alumina, silica, or other similar and commonly used oxide material," or "a 'sponge' type of material which can be metallic or oxide material with varying but generally small pore, high porosity material," column 2, lines 55-63). Furthermore, the substitution of known equivalent structures involves only ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

### ***Conclusion***


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is 703-305-4951\*\*. The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on 703-308-6824. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

*\*\* As of December 10, 2003, the telephone number will be changed to 571-272-1449.*

Jennifer A. Leung  
December 4, 2003



**HIEN TRAN  
PRIMARY EXAMINER**